

(taken at 8 a. m.) before 1 p. m., and sometimes not until the following day; while our forecast, issued at 4 p. m., is sometimes not received at important country centers before 9 or 10 p. m. Australian meteorology is greatly indebted to the Eastern Extension Cable Company for many concessions. During upward of twenty years this company allowed weather cablegrams from New Zealand to pass free of charge. This data was a great advantage to the forecaster at Sydney, in the case of impending east to southeast gales, which sometimes visit our east coast, as the prevision of these gales depends largely upon the knowledge of the fluctuations in atmospheric pressure which take place between Australia and New Zealand; the data formerly received from three stations in New Zealand often completed the information required by the forecaster in order to warn shipping interests, but the cable company terminated their concessions on April 30, 1904, consequently we are now without knowledge as to conditions beyond our eastern coast line.

The ultimate solution of present difficulties may be worked out by the establishment of a Federal Weather Bureau to assume control of the different state services now existing. The Australian Commonwealth Constitution, adopted on January 1, 1901, gives the Federal Parliament power to make laws concerning many questions, and amongst these we find "Meteorological Observations;" but in meteorology the Federal Government is, apparently, very slow to act. Doubtless there are many other questions of greater national importance, demanding more urgent attention in a country which claims to be the newest among the nations. But, on the other hand, state politicians give the explanation that meteorology is non-revenue producing, and for this reason, it is said, the Federal Government will be slow to pass laws for the establishment of a National Weather Bureau. The question of having such a bureau was apparently first considered by the Federal Cabinet about eighteen months after the inauguration of federation, or on May 15, 1902, but legislation was deferred apparently for three years. In May of the present year the several directors of meteorology in Australia held a conference in Adelaide for the purpose of reporting "on existing conditions and to make recommendations for the future conduct of the services," presumably in order to guide the Hon. Dugald Thomson, Minister for Home Affairs, who proposed to introduce a bill during the following session enabling the Federal Government to take over the astronomical as well as the meteorological departments in the several states. But the conference was not unanimous; only one director, Mr. Baracchi of Victoria, being desirous of separating meteorology from astronomy. A report of the proceedings contains the following recommendations:

(7) That a central institution be established for theoretical and scientific meteorology.

(8) That in each state there shall be an official whose duty it shall be to see that observations are properly taken, and all necessary local information supplied to the public. This official, in Sydney, Adelaide, and Perth, to be the Government Astronomer; but in Melbourne (as the Government Astronomer and his "Board of Visitors" desire to be relieved of all meteorological duties, on account of his more extended astronomical and scientific work), also in Brisbane and Hobart, where there is no Government Astronomer, the Weather Department shall be in charge of an officer appointed for the purpose, to be styled "State Meteorologist."

(Mr. Baracchi dissented.)

(9) That the weather service of Queensland and Tasmania be placed on a basis similar to that of other states.

(10) That weather forecasts shall be issued by each meteorologist for his own state, and for that state only, and shall be telegraphed immediately to the meteorologists of the other states, who shall see to their prompt publication.

(11) That a system of storm warnings for coastal districts shall be established upon some uniform basis for the whole of Australia, the warnings to be issued when considered necessary by the forecasting officials, each for his own state.

(12) That a definite period, say half an hour, shall be reserved each

day by the Telegraph Department during which weather telegrams shall have precedence. (This is the practise in the United States.)

(13) That weather forecasts and storm warnings shall likewise have precedence over all other telegrams.

(14) That astronomical and meteorological telegrams shall continue to be transmitted free throughout the Commonwealth, but under amended regulations, in order to avoid the delays and difficulties which now occur.

(15) That meteorological reports be transmitted and exchanged on Sundays, in order that weather charts, forecasts, and synopses of the weather may be available for all days of the year, without interruption.

(16) That postmasters having charge of meteorological instruments shall take all necessary readings, etc., and forward reports as required, without any special remuneration, as is now done in several of the states.

(17) That it is essential that meteorological outstations be periodically inspected.

(18) That uniform methods of publishing the daily weather information are desirable, similar forms to be used in each state.

(19) That each State Meteorological Department should have a room at the general post office of the state, to which all telegrams shall be transmitted, so that no delay may occur in publishing the same for the information of the public. Facilities should also be provided by the postal authorities of each state for exhibiting at the general post office and other selected offices weather maps and bulletins.

(20) That daily reports should again be exchanged with New Zealand, and similar information should also be supplied by New Caledonia, Norfolk Island, and Fiji.

(21) That meteorological and ocean current forms be distributed to oversea shipmasters, the results to be discussed and published by one state or the central bureau.

(22) That each observatory shall not, as at present, issue an annual statistical report, but until the establishment of a central bureau, as recommended in (7), the observations shall be collected by one of the Government Astronomers, and published upon some uniform basis as a report upon the meteorology of Australia. It is suggested that this work be done by the Adelaide Observatory.

(Mr. Baracchi dissented.)

A change took place in the Federal Government shortly after the above conference was held, and the following note appeared in the Sydney Daily Telegraph of August 9, 1905:

The proposal for the creation of a Commonwealth Meteorological Department and Weather Bureau is still under consideration. Mr. Groom, Minister for Home Affairs, stated in the House of Representatives today that the Federal Government would again communicate with the State Premiers to see to what extent, in view of the report of the Inter-State Astronomical Conference, it would be practicable to establish a Federal department. A bill was in preparation with a view to introduction, if possible, this session.

The information in this paper has been drawn from many sources, but the writer is under special obligations to the following:

1. History and Progress of Sydney Observatory. By H. C. Russell. 1882.

2. Astronomical and Meteorological Workers in New South Wales. By H. C. Russell. 1888.

3. A Review of Meteorological Work in Australia. By Sir Charles Todd. 1893.

4. The Annual Reports issued by the Australian Observatories.

5. Wragge's Almanacs. 1898 to 1902.

6. The Australian Year Books. 1883 to 1904.

#### STORM WARNINGS FOR LAKE VESSELS.

By Prof. E. B. GARRIOTT.

The lesson that may be learned from the unparalleled series of disasters of the closing months of the present season of lake navigation is that modern vessels of low steam power can not safely brave the severer storms of the Great Lakes.

Shipping losses of previous years have been almost wholly confined to sailing vessels and old-fashioned steamers, and the escape from disaster during the last few years of low power steamers of the modern type has been due solely to the fact that they have not been subjected to gales of the violence that marked the Lake Superior storm of November 28. It is apparent, also, that a more perfect system of storm warnings and advices would lessen the liability of disaster, and it is equally apparent that a hearty and intelligent cooperation with the Weather Bureau by shipmasters is essential to the enlargement and more perfect operation of this service.

In the case of vessels that are in port when storm warnings are displayed, the service now rendered by the Government is as satisfactory as present knowledge of storms and facilities for disseminating advices regarding them will permit, provided, of course, shipmasters seek and are guided by the detailed information that the advices convey. Vessels that are leaving port and those that may be able to sight warnings displayed on shore possess no means of knowing the character, as regards intensity, of an approaching storm, and vessels beyond the sight of land are unable to obtain a knowledge either of storm-warning displays or of the qualifying or emphasizing advices that form a part of hoisting orders.

Assuming that the skill of the Government forecaster is limited to an issue of warnings twelve to twenty-four hours before the full force of a gale is experienced, and that conscientious and active interest on the part of the shipmaster impels him to secure all possible information from one or more of the numerous storm-warning stations that circle the Great Lakes, it is obvious that an extension of the service to vessels in the open lake can be accomplished only by new and improved methods of communication.

The recent loss in three lake storms of more than 100 human lives and millions of dollars' worth of property, which, it is assumed, may in part be attributed either to failures to receive or failures to heed the warnings, renders imperative the adoption of measures and methods calculated to increase the effective operation of the warning service.

A measure that is now a practise with careful commanders would require vessel masters before leaving a port to consult and record the latest forecasts and advices issued by the Weather Bureau. A second, that could be adopted with profit during the stormy fall months, would be to have vessel masters in the open lake shape courses that would permit them to sight at intervals the storm-warning display stations, and in cases where displays are observed to adopt measures that may in their judgment be of advantage to their employers, to the lives and property in their charge, and to themselves. A feasible method of extending the scope and area of the distribution of advices would be the equipment of stations and vessels with wireless telegraph apparatus. The operation of this latter method would require one or two wireless stations on each lake shore and the methods of wireless communication between shore and ships that are being adopted by sea going vessels.

The measures and methods here outlined are practicable and can be rendered operative by cooperation between the Government and vessel owners. In a few years their adoption will be demanded as a purely business proposition.

#### RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a —

*American Journal of Science.* New Haven. 4th Series. Vol. 20. Dec., 1905.

Barus, C[arl]. Relations of ions and nuclei in dust-free air. Pp. 448-453.

*Engineering News.* New York. Vol. 54. Nov. 23, 1905.

Beardsley, J. W. Labor conditions in the Philippine Islands. [Includes observations of wind, temperature, and precipitation in Manila.] Pp. 538-544.

*Nature.* London. Vol. 75. Nov. 16, 1895.

Rotch, A[bbott] L[awrence] and Teisserenc de Bort, L[eon.] Exploration of the atmosphere over the tropical oceans. Pp. 54-56.

*Nature.* London. Vol. 73. Nov. 30, 1905.

Chree, Charles. Magnetic storms and auroras. [Notes on recent phenomena.] P. 101.

*Proceedings of the Royal Society.* London. Vol. 76. Dec. 6, 1905.

Lockyer, Norman, and Lockyer, Wm. J. S. The flow of the River Thames in relation to British pressure and rainfall changes. Pp. 494-506.

*Quarterly Journal of the Royal Meteorological Society.* London. Vol. 31. Oct., 1905.

Ball, John. On a logarithmic slide-rule for reducing readings of the barometer to sea-level. Pp. 285-292.

Fergusson, S. P. Two new meteorological instruments: 1. The automatic polar star light recorder; 1. The ombroscope. Pp. 309-316.

Hepworth, M. W. Campbell. Climatological observations at an Arctic station in Repulse Bay. Pp. 317-326.

Simpson, George C. Normal electric phenomena of the atmosphere. Pp. 295-306.

Strachan, Richard. Measurement of evaporation. Pp. 277-281.

*Review of Reviews.* New York. Vol. 32. Dec., 1905.

—Natural and artificial rain-formation. [Abstract of paper by Prof. von Schiller-Tietz]. Pp. 745-746.

*Science Abstracts.* London. Sec. A. Vol. 8. Nov., 1905.

A[llen], G. E. Laws of distribution of size in raindrops. [Abstract of paper by A. Defant.] P. 634.

*Scientific American Supplement.* New York. Vol. 60. Nov. 25, 1905.

—Some curious phenomena of rainfall. Pp. 25000-25001.

Montgomery, J. New principles in aerial flight. Pp. 24991-24993.

*Scientific American Supplement.* New York. Vol. 60. Dec. 16, 1905.

—Thermometers, pyrometers, and thermo-regulators operated by the pressure of saturated vapors. [Abstract from *La Science au XXme Siècle*]. Pp. 25048-25050.

*Symons's Meteorological Magazine.* London. Vol. 40. Nov., 1905.

Jenkin, Arthur P. Periodicity of rainfall. Pp. 179-181.

*Annales de Géographie.* Paris. 14 année. Nov. 15, 1905.

Vacher, Antoine. Le haut Cher, sa vallée et son régime. [Precipitation at Montluçon]. Pp. 399-423.

*Ciel et Terre.* Bruxelles. 26 année. Nov. 16, 1905.

L[ancaster], A. La température de la France et des pays limitrophes. [Abstract of paper by A. Angot, with additional remarks on the temperature of Belgium.] Pp. 427-442.

*Ciel et Terre.* Bruxelles. 26 année. Dec. 1, 1905.

Gosselet, J. Essai de comparaison entre les pluies et les niveaux de certaines nappes aquifères du nord de la France. Pp. 476-478.

*Comptes Rendus de l'Académie des Sciences.* Paris. Tome 141. Nov. 6, 1905.

Maillard. Sur la trombe du 4 juillet dans l'Orléanais. Pp. 742-744.

*Comptes Rendus de l'Académie des Sciences.* Paris. Tome 141. Nov. 13, 1905.

Hergesell, H. L'exploration de l'atmosphère libre au-dessus de l'Océan Atlantique, au nord des régions tropicales, à bord du yacht de S. A. S. le Prince de Monaco, en 1905. Pp. 788-791.

*Comptes Rendus de l'Académie des Sciences.* Paris. Tome 141. Nov. 20, 1905.

Rey, M. J. Observations d'électricité atmosphérique sur la Terre de Graham. Pp. 850-852.

*La Géographie.* Paris. Tome 12. Aug. 15, 1905.

Legendre, A. F. Le Sseu-tch'ouan. Son sol, son climat, ses productions. Pp. 87-98.

Steen, Aksel S. La sécheresse en Norvège. Pp. 09-102.

*Le Temps qu'il Fait.* Mons. 2 année. Nov., 1905.

Bracke, A. Anciennes observations faites à Jemappes. [1845-1848. 1853-1857.] Pp. 203-212.

Bracke, A. Échos du concours de prévision du temps. Pp. 201-203.

Touchet, Em. Photographie des éclairs. Pp. 213-220.

*Annalen de Physik.* Leipzig. 4 folge. Bd. 18. 1905.

Denizot, A. Zur Theorie der relativen Bewegung und des Foucaultschen Pendelversuches. Pp. 299-322.

*Gaea.* Leipzig. 41 Jahrgang. Dec. 1905.

—Wetterperioden. Pp. 705-707.

*Gaea.* Leipzig. 42 Jahrgang. Jan., 1906.

—Eine Anleitung zum Beobachten von Erdbeben. Pp. 17-28.

Klein, [Hermann J.]. Die bisherigen Erfolge der Wetterprognosen. Pp. 4-9.

*Illustrierte Aeronautische Mitteilungen.* Strassburg. 9 Jahrgang. Nov., 1905.

Archdeacon, Earnest. Vortrag von E. Archdeacon über den Schwebeflug. (Übersetzt durch A. de Quervain.) Pp. 342-353.

*Meteorologische Zeitschrift.* Wien. Band 22. Oct., 1905.

Greim, G. Schätzung der mittleren Niederschlagshöhe im Grossherzogtum Hessen im Jahre 1903. P. 477.

Hann, [Julius]. Bemerkungen über die Schwerekorrektion bei den barometrischen Höhenmessungen. Pp. 456-462.